Social Cohesion and Carbon Emissions

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Abstract

This paper demonstrates that population diversity and its adverse effect on social cohesion have a robust, causal, positive effect on the carbon emissions of sufficiently rich economies. An examination of geocoded data on emissions from fossil fuels reveals that such results holds at a subnational level as well. The documented effect of diversity operates through its impact on mistrust and on heterogeneity in preferences, which suggests a social dimension that must be contemplated when setting a strategy to curb human's carbon footprint.

JEL: O110, Q50, Q52, Z130

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In the past decades, people across the globe have become increasingly aware of the capacity of humans to either alleviate or aggravate the rise in global temperatures. On the one hand, the claim that humans bear a responsibility in the warming of the globe has become a consensus among the academic community (Cook et al, 2013). On the other, there has been an outbreak in the public's attention on concepts such as 'carbon footprint' and on ways of administering such phenomena (Turner, 2014). Albeit such consciousness, and despite an increasing number of international summits and conferences designed to tackle such problem, countries have failed to achieve substantial reductions in anthropogenic carbon emissions, the human-made gas that contributes the most in transforming global temperatures.

The literature on human's carbon footprint has focused on its proximate economic determinants. It has thus explored the relationship between economic growth and pollution (Dietz and Rosa, 1997;

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Raupach, et al, 2007), the role of economic incentives (Nordhaus, 2015; Stavins, 2011), and the extent to which some socioeconomic factors as population, urbanization, and trade may affect pollution (Halicioglu,2009; Kasman and Duman, 2015; Hémous, 2016).

Notwithstanding these contributions, the literature has yet to establish the extent to which social cohesion affects said global challenge. First, following Stavins (2011), global climate change constitutes the ultimate commons challenge. Second, higher levels of cohesion -as measured by lower diversity and/or fragmentation- have been associated with increased homogeneity in preferences and with higher levels of social trust (Ashraf and Galor, 2013). Hence, lower population diversity/fragmentation should facilitate coordination and cooperation when it comes to the use of commons. Particularly, it should facillitate the abatement of carbon emissions, thereby explaining the global variation in the release of said pollutant into the atmosphere.

When unveiling such relationship, however, it is important to keep in mind the reason why the concentration of atmospheric carbon dioxide may be considered the ultimate common: Its detriment is more slow and less noticeable than with any other common -thereby exacerbating the coordination problem-, while the opportunity costs of avoiding such deterioration may be sizable, particularly for the poorest nations, as it has involved employing -or foregoing- resources that could be vital in the short-run for the implementation of needed social programs. One would thus expect lack of social cohesion to severely curb efforts in solving the emissions problem in wealthy economies, while playing an insignificant role for those nations facing a big opportunity cost of foregoing economic gains.

The starting point of this document is thus twofold: On the one hand, the idea that repsonses towards the environmental problem have differed depending on the level of wealth of each country, an argument widely shared by both economists and other social scientists (Guha, 2000; Ho, 2006; Nixon, 2011, Nordhaus, 2015; Stavins, 2011). On the other, the documented effects of diversity on trust and on heterogeneity of preferences (Ashraf and Galor, 2013b; Arbatli, Ashraf and Galor, 2015; Galor and Klemp, 2017), making it less likely for the population of non-cohesive countries to achieve an agreement when tackling the environmental challenge.

This document argues that sufficiently wealthy economies (as will be shown, those above the 30th percentile in the distribution of income per capita) exhibit a strong relation between lack of cohesion and higher levels of CO2. Further, an instrumental-variable analysis at various levels of analysis allows to ascertain that such relation is both robust and causal. This implies that policies aimed at tackling social divisiveness and fostering social capital could prove crucial in a broader strategy aimed at curbing human's effect on climate change. The remaining of the document is structured as follows: Section 1 reviews related literature. Section 2 discusses the main variables that will be employed in the analysis. Section 3 presents and discusses the main results, which are divided into (i) cross-country (ii) repeated cross-country and (iii) cross section at a sub-national level. Section 4 examines the mechanisms through which diversity may affect emissions. Finally, section 5 summarizes the main results and concludes.

1 Related Literature

The economics literature has identified carbon emissions as a commons problem that is particularly susceptible to free-riding. Economic agents within countries contaminate without internalizing the costs of their actions, as the damages of emitting mainly fall outside the boundaries and the temporality in which such actions take place (Nordhaus, 2015; Stavins, 2011). This diagnosis points to solutions aimed at aligning the proper incentives so that social costs are internalized when choosing how much carbon to oust into the environment. Hence, the policy avenues explored by the literature range from a system of sanctions and duties at an international scale (Acemoglu et. al., 2011; Hémous, 2016, Nordhaus, 2015), to efficient taxing policy capable of facilitating internalization of costs without excessive distortions on economic activity (Barrage, 2016; Golosov et. al., 2014). Further, the literature has highlighted that the success of such measures is determined by the composition of clean vs. polluting activities at the time of implementation, and by the exhaustibility of the inputs needed for the latter (Acemoglu et al., 2012; Hémous, 2016). This paper complements the existing findings by considering a different dimension, and demonstrating that the collective problem is crucially determined by social cohesion, which is understood in this document as a category capturing social coordination and cooperation at a national and subnational level. Hence, a solution to the environmental problem related to carbon emissions should not exclusively focus on incentives, as those measures may not tackle -and could even worsen- the underpinnings of cohesion (Bowles & Polanía-Reyes, 2012).

At an empirical level, the literature has identified an array of variables that significantly affect pollution and that must be contemplated when designing policies to tackle carbon emissions. One of the cornerstones of this literature is the direct link between pollution and the extraction and employment of fossil fuels. Following Hoel et. al. (1996) and Withagen (1994), these constitute preeminent reasons behind the accumulation of anthropogenic carbon emissions. Accordingly, the relevance of the industrial/manufacturing sector in the economy is an important reason behind human-made emissions, as such economic segments have historically been extensive users of polluting energy inputs. This explains why a significant effort has been placed at identifying profitable and efficient alternative sources of energy that are less harmful for the atmosphere.[1]

The literature has also examined the relevance of several variables affecting carbon pollution. International trade is one of such factors, as the degree of openness has been both empirically and theoretically established as a determinant of per capita emissions (Halicioglu,2009; Hémous,2016; Kasman and Duman, 2015). The degree of a nation's urbanization, on the other hand, constitutes another key variable investigated by economists, as highly-urbanized nations (through a higher concentration of individuals and polluting-activities) tend to experience higher levels of CO2 contamination (Kasman and Duman, 2015). In addition to the environmental problem posed by agglomeration and population density in urban areas, the level of population itself constitutes a key driver of pollution; Casey and Galor (2017) find that curbing the carbon footprint while avoiding negative outcomes on the economy is achievable through policies that target population growth, as lower levels of population have been empirically linked to both lower levels of per-capita CO2 and higher level of income per capita.

Building upon the above, this document draws from the growing literature on the economic effects of diversity and fragmentation (Ashraf and Galor, 2013a and 2013b; Alesina et. al., 2003; Alesina et. al., 2016; Desmet and Wacziarg, 2012) to show that the global environmental problem is also susceptible to lack of cohesion. Further, this document exploits Ashraf and Galor (2013)'s measure of population diversity to show its robust and significant role as a driver of emissions across and within countries, and thus contributes to the growing literature documenting the various spheres for which such measure has been found to be a key determinant, including conflicts (Arbatli et al., 2015), the emergence of autocratic regimes (Galor and Klemp, 2017), within-group productivity (Ashraf et. al.,

[1]Nuclear energy constitutes one of such efficient, profitable, alternative sources of energy. However, due to reasons beyond the scope of this article -some of which are also related to environmental concerns-, this source has not become a widespread source of energy.

2015), and specialization (Depetris-Chauvin and Özak, 2017).

In addition to the above literature, this research is also a contribution to the literature amongst political ecologists and environmental historians. Nixon (2011) argues that there is a division between a "Global South" and a "Global North", and that the understanding of the environmental problem and its solutions significantly differs between one and another. Guha (2000) claims that ever since a global environmental problem has been identified, governments across the "Global South" have prioritized economic security for their population over solutions to the environmental problem, whilst their counterpart has identified the problem but failed to solve it. Consistent with such line of argument, this document reveals that the role of fragmentation/divisiveness in explaining CO2 pollution becomes salient as income increases. Further, it provides empirical grounds for the arguments highlighting a global division when it comes to the social and political understandings of -and attitudes towards- the environmental challenge.

2 Introducing the Variables of Interest

The main outcome variable assessed by this document is per capita CO2 emissions on a yearly basis. At a national level, this comes from the Carbon Dioxide Information Analysis Center at the Oak Ridge National Laboratory, which is available in the World Bank databases. At a subnational level, the data comes from the Fossil Fuel Data Assimilation System (FDDAS), a high-resolution estimation of global fossil fuel CO2 emissions developed by Asefi-Najafabady et. al. (2014), which has been made available to the public. Other relevant outcome variables that are also exploited include the OECD/IEA estimates of the percentage of total energy consumption coming from renewable sources, and information on the ratification of the Kyoto Protocol from the United Nations Framework Convention on Climate Change. The appendix contains a detailed description of the variables employed, along with the corresponding summary statistics.

As stated earlier, the working hypothesis is that lack of cohesion within a country facilitates higher levels of emissions, as it is associated with lower coordination and cooperation. By proxying for the difficulty of societies in agreeing and acting against the environmental threat, measures that capture lack of cohesion should thus be positively associated with higher levels of per capita CO2 emissions. However, this relation is expected to also be mediated by the country's wealth, as the lat-

Table 1: Effect of Cohesion on Carbon Emissions as Income Increases

Dependent Variable: Log CO2 per capita in 2000						
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	OLS	OLS	OLS
(Population Diversity)* log(GDP per capita)	9.509***					
	(1.886)					
(Religious Frac.)* log(GDP per capita)		0.386*				
		(0.209)				
(Ethnolinguistic Frac)*log(GDP per capita)			0.737***			
			(0.212)			
(Ethntic Frac)*log(GDP per capita)				1.062***		
				(0.174)		
(Polarization Index)*log(GDP per capita)					-1.929**	
					(0.778)	
(Cultural Divisivness)* log(GDP per capita)						0.907***
						(0.269)
Observations	140	140	140	140	140	140
R-squared	0.742	0.721	0.751	0.776	0.748	0.739

Note: Using OLS regressions, this table demonstrates the positive effect of various measures of diversity/fragmentation on countries' emissions as income increases. All terms of the interaction are accounted for, but only the coefficients of the interactions are presented as they are the relevant ones. Heteroskedasticity robust standard errors reported in parentheses. *** denotes p<0.01, ** p<0.05, and * p<0.1

ter crucially determines the capacity of countries to transition into less-polluting economic activity (Greenstone and Jack, 2015). This implies that the relevance of social fragmentation in explaining carbon emissions should show up empirically as income increases, as captured by a positive and significant \beta in the regression below:

$$ln(CO2.p.c)_i = \alpha + \beta\{Cohesion_i * ln(GDP.p.c)_i\} + \delta Cohesion_i + \vartheta ln(GDP.p.c)_i + \varepsilon_i \qquad (1)$$

Should the envisioned relationship hold in the data, one would expect this basic correlation to hold when employing various measures of cohesion within a society. As a starting point for the analysis, it is thus critical to assess the performance of critical measures developed by the literature in such direction. Table 1 reports the effects of Ashraf and Galor (2013)'s Population Diversity, Alesina et. al. (2003)'s Ethnic Fractionalization and Religious Fractionalization, Desmet et. al. (2009)'s Ethnolinguistic Fractionalization, Reynal-Querol (2002)'s Polarization, as well as Fearon et al. (2003)'s Cultural Divisivness, when interacted with the log value of a country's income per capita.

These results, although simple correlations, provide reassuring evidence that various measures of cohesion as income increases exhibit a significant relation with carbon emissions at a country level. Five of the six measures (Population Diversity, Ethnic Fractionalization, Religious Fractionalization, Cultural Divisiveness, and Ethnolinguistic Fractionalization) exhibit a robust correlation when interacted with income per capita, with Ashraf and Galor (2013)'s measure capturing a more sizable

Table 2: Horse Race among various measures of Cohession

Dependent Variable: Log CO2 per capita in 2000						
	(1)	(2)	(3)	(4)	(5)	(5)
	OLS	OLS	OLS	OLS	OLS	OLS
(Population Diversity)* log(GDP per capita)	9.509***	9.244***	7.145***	5.250**	8.060***	7.861***
	(1.886)	(1.876)	(2.524)	(2.394)	(1.728)	(2.230)
(Religious Frac.)* log(GDP per capita)	0.267					-0.248
	(0.213)					(0.190)
(Ethnolinguistic Frac)*log(GDP per capita)		0.585***				0.342
		(0.216)				(0.246)
(Ethnic Frac.)* log(GDP per capita)			0.981***			1.195***
			(0.203)			(0.269)
(Polarization Index)*log(GDP per capita)				-2.143***		-3.964***
				(0.753)		(0.826)
(Cultural Divisivness)*log(GDP per capita)					0.735***	-0.290
					(0.264)	(0.273)
Observations	140	140	140	140	140	140
R-squared	0.745	0.765	0.786	0.766	0.757	0.834

Note: This table shows the results after performing a horse-race among the interaction of various measures of diversity/fragmentation and income, and shows that Population Diversity has the strongest and most significant effect on carbon emissions as income increases. All terms of the interaction are accounted for, but only the coefficients of the interactions are presented, as they are the relevant ones. Heteroskedasticity robust standard errors reported in parentheses. *** denotes p<0.01, ** p<0.05, and * p<0.1

effect than the rest. Considering such consistent positive relation between cohesion and carbon pollution as income increases, it becomes critical to test which of these measures achieves the strongest effect (both statistically and economically). This can be seen in Table 2, which essentially presents the results from a horse-race between the various measures of cohesion. It is notable that Population Diversity preeminently captures the most significant and sizable effect on emissions per capita, both when doing a pairwise comparison and when assessing the strength of the entire set of measures together.

All in all, Population Diversity constitutes the strongest measure in capturing the effect of cohesion on emissions as income increases. Hence, as the identification strategy will be based on such variable, a word of analysis on it is needed at this point. Ashraf and Galor's measure is on first instance based on measured genetic diversity, which essentially computes the probability of two individuals being genetically different when focusing on a spectrum of genetic traits, and considering for each of these traits the frequency of occurrence of its variants. Such observed diversities are calculated for each country's set of indigenous ethnic populations.

On a second instance, and to avoid problems of the measure's endogeneity arising from movement of populations across space, the authors develop an indicator termed 'ancestry adjusted predicted diversity', which exploits the serial founder effect linked to the 'Out of Africa' Hypothesis: The idea that populations migrating farther apart from East Africa, the birthplace of the Homo Sapiens, carry smaller subsets of the genetic admixture, and are thus less genetically diverse. They arrive at it by calculating the genetic diversity that is predicted by an adjusted measure of migratory distance from East Africa; the authors generate a weighted average of the migratory distances of each of the groups composing a country's contemporary population, and use such averge distance to project a contemporary degree of diversity. This will be relevant going further, as it will provide a clean instrument in assessing causality, which will be discussed with more detail in the following section. In what follows, the relationship between this variable and carbon emissions is going to be examined more closely to demonstrate not only a strong and robust relation at various levels, but also a causal one.

3 Main Results

3.1 Cross-National Results for the Year 2000

The correlations presented in the prior section show that the effect of cohesion on carbon emissions becomes stronger as income increases. However, both the economics literature (Nordhaus, 2015; Greenstone and Jack, 2015) and the environmental literature from other social disciplines (Guha, 2000; Nixon, 2011) stress an income segmentation of the globe when it comes to the capacity and willingness of countries to tackle the carbon emissions' problem. Incorporating this dimension to the envisioned relation, one should expect cohesion to be critical in explaining the carbon pollution for those countries that have both sufficiently high income and sufficiently low social opportunity costs of fostering a transition towards greener forms of economic activity. Conversely, cohesion (or lack thereof) should play an insignificant role in explaining carbon emissions from poor countries, as the necessary condition for it to be a critical -namely, sufficient economic wealth- has not been met for such societies. Testing these ideas thus requires assessing whether there is an income threshold after which diversity's effect becomes salient, and whether such segmented relationship is both robust and causal. Table 3 allows to establish a reasonable income threshold fter which population diversity becomes critical. This segmentation will enable a deeper scrutiny into the differentiated effects of diversity across the globe.

Diversity exhibits a marginal negative effect on emissions in the whole sample, which then be-

Table 3: Population Diversity's Effect by Income Threshold

Dependent Variable: Log CO2 per capita in 2000				
	(1)	(2)	(3)	(4)
	OLS	OLS	OLS	OLS
Population Diversity	-9.298*	3.216	13.75***	14.28***
	(4.705)	(3.962)	(2.951)	(3.317)
Observations	151	128	106	83
R-squared	0.021	0.004	0.123	0.168
Sample Excluded	None	Lowest 15th Income Percentile	Lowest 30th Income Percentile	Lowest 45th Income Percentile

Note: This table shows how Population Diversity's significant effect on varies as low-income countries are excluded from the sample. Specifically, it shows that Population Diversity is not a significant correlate of emissions when contemplating the whole globe, and suddenly becomes economically and statistically significant when excluding the countries below 30th-percentile threshold in the global income distribution. Heteroskedasticity robust standard errors reported in parentheses. *** denotes p<0.01, ** p<0.05, and * p<0.1

comes positive and stronger as non-wealthy economies are excluded from the sample. The data shows that the 30th percentile of income per capita constitutes a reasonable threshold upon which one may observe a shift in the relevance of cohesion. The document will henceforth exploit a dummy segmenting 'high-income' (i.e., sufficiently wealthy) from 'Low-Income' (i.e., non-wealthy) economies, depending on whether the country is above or below the 30th percentile of income in the year 2000. The results from this segmentation, however, are also robust to other forms of categorization: Assuming the low v.s. high-income categorization provided by the world bank, or changing the cutoff to be the 35th percentile, for example, lead to almost identical results. Table B in the appendix presents results under such alternatives.

Considering the above, the following specification will be tested separately for high and low income countries:

$$ln(CO2.p.c)_i = \alpha + \beta PDiv + \delta ln(GDP.p.c)_i + \vartheta' \mathbf{X}_i + \varepsilon_i \qquad (2)$$

With i being a country, $PDiv_i$ its measure of Population Diversity,$ln(GDP.p.c)_i$ its GDP per capita in dollars of the year 2000, while $\mathbf{X}_i$ a vector of potential confounders. The latter includes continent fixed effects, covariates capturing the effect of institutions, geographical controls, and further covariates that may systematically affect the results. Geographical controls include terrain's ruggedness, absolute latitude, temperature, precipitation, elevation, and indicators for landlocked and island countries, all of which may systematically affect emissions by imposing specific conditions to economic activities.

On the other hand, institutional controls include indicators for the legal origins of each country - which provide a framework that may differentially facilitate the implementation of changes required

Table 4: Effect of Population Diversity for High and Low-Income Countries

Dependent Variable: Log CO2 per capita in 2000					
	(1)	(2)	(3)	(4)	(5)
	High Income	High Income	High Income	High Income	Low Income
	OLS	OLS	OLS	OLS	OLS
Population Diversity	15.26***	7.920***	7.258**	7.045**	-15.28
	(3.043)	(2.770)	(2.801)	(3.246)	(19.34)
Log (GDP per capita)		0.731***	0.812***	0.698***	0.106
		(0.103)	(0.108)	(0.157)	(0.582)
Oil Revenues (Share of GDP)		0.029***	0.024**	0.029***	4.667
		(0.011)	(0.011)	(0.014)	(6.378)
Democracy (Polity IV - Extent)			-0.025	-0.02	0.222
			(0.025)	(0.025)	(0.395)
Schooling (Average years of)			0.106**	0.088	0.039
			(0.053)	(0.056)	(0.248)
Scientific Articles (Per thousand)			-1.156**	-1.079*	136.3
			(0.546)	(0.592)	(87.40)
Trade (Share of GDP)				0.000	0.001
				(0.001)	(0.006)
Ethnic Inequality (Alesina et. al., 2017)				-0.129	-1.047
				(0.311)	(0.680)
Urbanization (% living in cities)				0.008	0.040
				(0.008)	(0.023)
Population (in millions)				0.000	-0.001
				(0.000)	(0.003)
GDP Composition	No	Yes	Yes	Yes	Yes
Continental FE	No	Yes	Yes	Yes	Yes
Geographical Controls	No	Yes	Yes	Yes	Yes
Legal Origins FE	No	Yes	Yes	Yes	Yes
Observations	93	93	93	93	35
R-squared	0.167	0.803	0.819	0.825	0.949

Note: Using OLS regressions, this table shows the significant and robust effect of Population Diversity on the emissions of sufficiently rich economies. Population Diversity appears to be significantly related to emissions even after the inclusion of proximate social and economic correlates. Conversely, diversity appears to be insignificant when explaining emissions of low-income countries.High Income corresponds to countries above the 30th percentile in the distribution of income. Continental FE controls for belonging to either America, Africa, Asia, Europe or Oceania. Legal Origins FE indicates whether the country has its legal structure founded on either the British, French, German, Scandinavian or Socialist antecedent. Geographical controls include terrain's ruggedness and its square, absolute latitude, dummies for landlock and island, temperature, precipitation variability, average elevation and its squared, and indicators for landlocked and island countries. GDP Composistion includes the share of output that corresponds to agriculture, industry and services. Heteroskedasticity robust standard errors reported in parentheses. *** denotes p<0.01, ** p<0.05, and * p<0.

to curb emissions-, extent of democracy -which may systematically affect the success of the institutional channels through which environmental concerns are heard and agreed upon-, along with both schooling and scientific articles -which may affect the consciousness regarding the environmental challenge and thus the likelihood of actions against it-. Finally, further controls include variables discussed in Section II, including: the degree of urbanization, population, trade openness, the economic composition of GDP (i.e., the participation of services, industrial and agricultural activities), and oil rents (as measured by the difference between the value of production at international prices minus the costs of oil-production for the specific country) as a share of GDP. Table 4 presents the results of this specification.

Overall, the effect of diversity on carbon pollution for wealthy economies appears to be positive, significant, and robust to the sequential inclusion of the controls pointed by the literature. Conversely, the effect appears to be insignificant for non-wealthy economies. This provides reassuring evidence in favor of the relationship hypothesized by the political ecology/environmental history literature, suggesting different social determinants of the environmental problem across the globe. Further, despite an initial decrease in size, the coefficient accompanying population diversity stabilizes after further inclusion of relevant covariates. Following the estimated effect from the specification with the full set of covariates (column 4), a 1 percentage point increase in predicted diversity is associated with an increase of 6.8 percent in emissions per capita for the set of wealthy countries. Figure 1 below plots the conditional and unconditional relation between diversity and emissions for the set of wealthy economies, visually corroborating the robust relation between these variables as envisioned in this document.

Figure 1: Relation Between Population Diversity and Carbon Emissions.

Panel A. Unconditional relation *Panel B. Conditional relation*

Note: These figures depict the unconditional and conditional relation between Population Diversity and Carbon Emissions of countries above the 30th percentile of the global income distribution.

The segmented-sample analysis allows to assess causality at a country level, which can be achieved by instrumenting appropriately for Population Diversity. Following Ashraf and Galor (2013), adjusted migratory distance crucially accounts for the mass-displacements and migrations in the colonial and post-colonial periods. Hence, employing a measure that does not account for such colonial movements -i.e., a precolonial unadjusted distance from East Africa to the centroid of each country-, should be correlated with the adjusted measure whilst arguably being uncorrelated to contemporary measures of CO2 emissions through all channels different than Population Diversity. Indeed, other studies (see Arbatli, Ashraf, and Galor, 2015; Galor and Klemp, 2017) have successfully employed precolonial migratory distance as an instrument for contemporary population diversity. As in those investigations, there is no reason to refute the exclusion restriction from holding in this case. Table 5 presents the results from the instrumental-variable analysis

Such results provide evidence in support of a causal effect of population diversity on carbon emissions for the set of sufficiently-wealthy economies, while proving to be systematically irrele-

Table 5: Instrumental Variable Analysis

	Dependent Variable: Log CO2 per capita in 2000				
	(1)	(2)	(3)	(4)	(5)
	High Income	High Income	High Income	High Income	Low Income
	IV - 2SLS	IV - 2SLS	IV - 2SLS	IV - 2SLS	IV - 2SLS
Population Diversity	15.20***	14.98**	14.07**	13.69**	-13.36
	(4.431)	(7.235)	(6.435)	(6.463)	(9.962)
Log (GDP per capita)		0.697***	0.781***	0.677***	0.086
		(0.104)	(0.104)	(0.129)	(0.303)
Oil Revenues (Share of GDP)		0.024***	0.020**	0.023*	4.405
		(0.009)	(0.010)	(0.012)	(3.350)
Democracy (Polity IV - Extent)			-0.016	-0.010	0.217
			(0.023)	(0.022)	(0.209)
Schooling (Average years of)			0.097**	0.079*	0.028
			(0.044)	(0.045)	(0.130)
Scientific Articles (Per thousand)			-1.177**	-1.096**	137.5***
			(0.460)	(0.478)	(46.58)
Trade (Share of GDP)				0.001	0.001
				(0.002)	(0.003)
Ethnic Inequality (Alesina et. al., 2017)				-0.063	-1.062***
				(0.272)	(0.335)
Urbanization (% living in cities)				0.008	0.042***
				(0.006)	(0.012)
Population (in millions)				0.000	-0.002
				(0.000)	(0.002)
GDP Composition	No	Yes	Yes	Yes	Yes
Continental FE	No	Yes	Yes	Yes	Yes
Geographical Controls	No	Yes	Yes	Yes	Yes
Legal Origins FE	No	Yes	Yes	Yes	Yes
Observations	93	93	93	93	36
1st Stage F-Statistic (K-P)	47.461	21.179	20.338	24.212	1209.82

Note: With an instrumental-variable's approach, these 2SLS regressions demonstrate that the significant effect of Population Diversity on the emissions of sufficiently rich economies is a causal one. Conversely, diversity appears to be insignificant when explaining emissions of low-income countries.High-Income corresponds to countries above the 30th percentile in the distribution of income. Continental FE controls for belonging to either America, Africa, Asia, Europe or Oceania. Legal Origins FE indicates whether the country has its legal structure founded on either the British, French, German, Scandinavian or Socialist antecedent. Geographical controls include terrain's ruggedness and its square, absolute latitude, dummies for landlock and island, temperature, precipitation variability, average elevation and its squared, and indicators for landlocked and island countries. GDP Composistion includes the share of output that corresponds to agriculture, industry and services. Population Diversity is instrumented using unadjusted migratory distance from East Africa to the centroid of each country. Heteroskedasticity robust standard errors reported in parentheses. *** denotes p<0.01, ** p<0.05, and * p<0.1

vant for the set of non-wealthy ones. It should be noted here that the well-identified IV-estimates appear to be substantially higher than those from the OLS estimates. One potential explanation for this higher estimator comes from the fact that pollution and environmental degradation on a broad sense -of which carbon emission is a key component- have been a burden suffered by specific subgroups within societies. This has been the object of a critical field within environmental activism and studies, which among others has denounced that some ethnicities and racial groups have been systematically targeted as bearers of pollution (Cole, 1994; Braun and Kisting, 2006; Braz and Gilmore, 2006). This would imply that populations across the globe may have been subject in the past century to a homogenizing pressure from pollution, resulting in a downward bias in the OLS estimates of diversity on pollution.

The segmentation between wealthy and non-wealthy economies can be explored further through an estimation that incorporates a high-income dummy and assesses the relevance of population diversity when interacted with such dummy:

$$ln(CO2.p.c)_i = \alpha + \beta\{PDiv_i * HighInc_i\} + \psi PDiv_i + \vartheta HighInc_i + \gamma' \mathbf{X}_i + \varepsilon_i \qquad (3)$$

Following this document's argument, one should expect β to be positive, sizable and significant, while ψ to be insignificant throughout. The specification above does not include income per capita as a covariate to avoid concerns of the results being driven by collinearity. It should be noted, however, that the results are qualitatively no different when including such covariate, as shown in Table B in the Appendix. Reassuringly, as shown in Table 6, diversity appears to be relevant only for wealthy economies, a result that survives the inclusion of all relevant controls.

Table 6: Results from Specification following Eq. (3)

	Dependent Variable: Log CO2 per capita in 2000			
	(1)	(2)	(3)	(4)
	OLS	OLS	OLS	OLS
Population Diversity*(High Income)	20.47**	16.11**	17.50**	14.38*
	(9.935)	(8.118)	(8.423)	(8.143)
Population Diversity	-4.517	-8.355	-10.50	-8.679
	(9.413)	(8.000)	(8.271)	(7.326)
High Income	-12.64*	-10.45*	-11.43*	-9.634
	(7.289)	(5.938)	(6.197)	(5.947)
Oil Revenues (Share of GDP)		0.044***	0.029	0.041***
		(0.015)	(0.018)	(0.016)
Democracy (Polity IV - Extent)			-0.019	-0.011
			(0.033)	(0.028)
Schooling (Average years of)			0.134**	0.070
			(0.061)	(0.064)
Scientific Articles (Per thousand)			0.275	-0.003
			(0.596)	(0.534)
Trade (Share of GDP)				0.002
				(0.001)
Ethnic Inequality (Alesina et. al., 2017)				-0.368
				(0.313)
Urbanization (% living in cities)				0.025***
				(0.007)
Population (in millions)				0.001**
				(0.000)
GDP Composition	No	Yes	Yes	Yes
Continental FE	No	Yes	Yes	Yes
Geographical Controls	No	Yes	Yes	Yes
Legal Origins FE	No	Yes	Yes	Yes
Observations	129	129	129	129
R-squared	0.702	0.825	0.836	0.871

Note: Using OLS regressions, this table shows that the results of including a high-income dummy for the complete set of countries are consistent with the segmented-sample results. The dummy 'High Income' takes the value of 1 if the country is above the 30th percentile in the distribution of income. Continental FE controls for belonging to either America, Africa, Asia, Europe or Oceania. Legal Origins FE indicates whether the country has its legal structure founded on either the British, French, German, Scandinavian or Socialist antecedent. Geographical controls include terrain's ruggedness and its square, absolute latitude, dummies for landlock and island, temperature, precipitation variability, average elevation and its squared, and indicators for landlocked and island countries. GDP Composistion includes the share of output that corresponds to agriculture, industry and services. Heteroskedasticity robust standard errors reported in parentheses. *** denotes $p<0.01$, ** $p<0.05$, and * $p<0.1$

Specification (3) yields consistent results when examining other outcome variables that are related to emissions. As shown in Tables C and D in the appendix, diversity of high-income countries appears to be strongly associated to lower usage of renewable sources of energy in the economic activity, while it also appears to be strongly associated to a reduced likelihood of a quick signature and ratification of the 1997 Kyoto protocol.

3.2 Pooled Cross-Section Analysis

Up until this point, the document has exploited data from the year 2000 in establishing a significant and causal effect of population diversity on emissions for the set of wealthy countries. To assess further such segmented effect, the relation can be tested using data between 1970 and 2012. Crucially, the 'High-income' category can now be granted a time-varying nature: $HighInc_{i,t}$ assumes the value of 1 only after the country's income per capita surpasses the 30th percentile threshold established for the year 2000. This time-varying indicator allows to control for both unobservable time-unvarying characteristics and time-specific shocks, thus enabling cleaner and more precise estimates.

Further, this wider span can be exploited in assessing causality. Although societies have had an environmental consciousness well before modern times, consciousness on the magnitude and reach of the human-made pollution started to consolidate among the scientific community during 1970's, after Rachel Carson's seminal work Silent Spring, and subsequently with the study commissioned by the Club of Rome to MIT titled Limits to Growth (Guha, 2000). Albeit an increasing scientific consensus on the worldwide environmental challenges associated with increased economic activity, common knowledge on the responsibility of humans in the making of climate change though the concentration of carbon dioxide in the atmosphere materialized only after 1991, year in which the first truly global environmental summit was announced and corresponding preparation from all countries began (Guha, 2000). Named as the Rio Earth Summit, this gathering unambiguously informed policy makers and the public around the world of the perils associated to high levels of carbon emissions.

For the purposes of this paper, the fact that such generalized knowledge came after 1991 implies that the lower levels of cooperation and coordination resulting from high diversity of wealthy economies should become salient specially after such year. The following estimation is aimed at capturing such time-specific effects:

$$ln(CO2.p.c)_{i,t} = \alpha + \beta\{PDiv_i * HighInc_{i,t} * PostRio_t\} + \psi\{PDiv_i * HighInc_{i,t}\} + \vartheta\{HighInc_{i,t} * PostRio_t\} + \mu HighInc_{i,t} + \lambda'\{PDiv_i * \gamma_t\} + \gamma_t + \delta_i + \varepsilon_{i,t} \qquad (4)$$

Where, as above, $PDiv_i$ is the population diversity of country i, $HighInc_{i,t}$ is the time-varying dummy that takes the value of 1 if country i at time t had an income above the income-threshold determined above, and $PostRio_t$ is a dummy that takes the value of 1 for all years after the Rio Summit

(1992 and onwards). The specification also accounts for country fixed effects δ_i, time fixed effects γ_t, and an interaction of the latter with population diversity. A significant, positive, and sizable β is to be expected, while ψ should be marginal if not insignificant (diversity mattered mainly after the Rio Summit). The results of such estimation are reported in table 7, below:

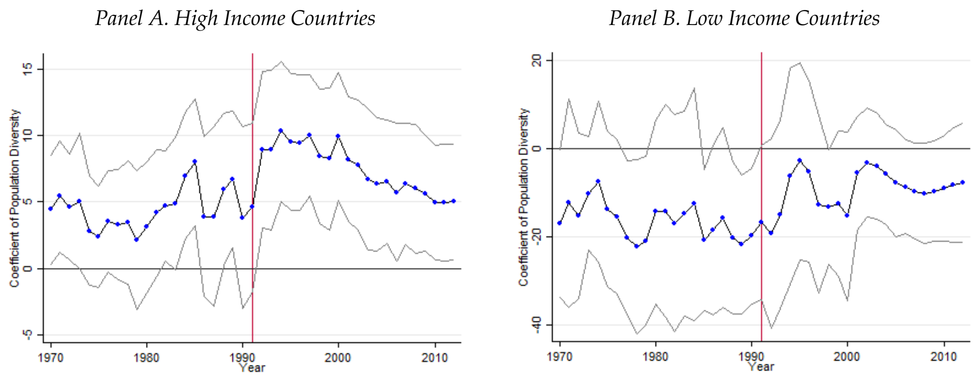
Table 7: Repeated Cross-Section

Dependent Variable: (Log CO2 per Capita)i,t	(1)	(2)	(3)	(4)	(5)
	All Countries	All Countries	All Countries	All Countries	Non-Soviet
	OLS	OLS	OLS	OLS	OLS
Population Diversity*(High Income)i,t*(Pos-Rio)t			10.02***	9.952***	10.93***
			(2.948)	(2.981)	(2.977)
Population Diversity*(High Income)i,t	3.977	5.832*	-0.794	-0.898	-1.049
	(3.472)	(3.004)	(2.598)	(2.635)	(2.670)
(High Income)i,t	-2.658	-3.949*	0.926	1.001	1.095
	(2.545)	(2.183)	(1.881)	(1.908)	(1.930)
(High Income)i,t*(Pos-Rio)t			-7.451***	-7.402***	-8.062***
			(2.180)	(2.203)	(2.202)
Time FE	No	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes
Pop.Div*Time FE	No	No	No	Yes	Yes
Observations	5,969	5,969	5,969	5,969	5,459
R-squared	0.953	0.961	0.962	0.962	0.962

Note: Using Pooled OLS regressions, this table shows that the robust effect of Diversity the emissions of rich economies materialized after there was common knowledge if the environmental challenge, which happened after the 1992 Earth Summit in Rio de Janeiro. (High Income)i,t is a time-varying dummy that takes the value of 1 at the year t in which country i has an income per capita greater than the income per capita corresponding to the 30th percentile of year 2000. (Post Rio)t takes the value of 1 when the observation corresponds to a year after 1991 (when notification and preparation for the summit began). The Non-Soviet sample involves all countries that were not either direct signatories of the Warsaw Pact or under the direct influence of the Soviet Union. Country FE and Time FE correspond to country and time fixed effects, respectively. Pop.Div*Time FE controls for the time-varying effect of diversity. The individual terms of all interactions are accounted for in each specification. Heteroskedasticity robust standard errors clustered at the country level are reported in parentheses. *** denotes p<0.01, ** p<0.05, and * p<0.1

Columns 1 and 2 report the estimation without including interactions with the Post-Rio dummy, while columns 3-5 include such interaction. All columns incorporate a time-varying categorization for non-wealthy and wealthy economies, and thus allow to control for country-specific characteristics and for time-specific shocks. Columns 1 and 2 show that if the time-specific nature of cohesion is disregarded, diversity from high income countries is only weakly associated to higher emissions. What's more important, Columns 3 and 4 show that, after controlling for unobservables, the diversity of wealthy economies becomes economically and statistically relevant precisely after the Rio Summit, corroborating the hypothesis that such effect is the result of both lack of coordination and cooperation from wealthy non-cohesive societies. Finally, one could argue that the timing of the Summit coincided with the aftermath of the fall of the Berlin Wall and the Soviet Union, and that better quality in information-systems and reporting from such economies could thus be driving the results. Column 5 tackles such concern by excluding from the analysis those countries that were either signatories or under the direct influence of the Warsaw Pact, showing that the results are almost identical.

Figure 2: Yearly Effect of Diversity



Note: This figure shows the timming of Diversity's effect to be in 1992 and thereafter, which coincides with the Rio Summit of 1992. Dotted line represents the estimators for each of the years of a regression of emissions per capita on Population Diversity and log GDP per capita. Grey line represents a 97.5% confidence interval. The vertical red line marks 1992, the year of the Earth Summit at Rio.

This robust result survives the inclusion of further covarites, as shown in Table D in the appendix, which exhibits the results when including various such as population, income, urbanization and trade.

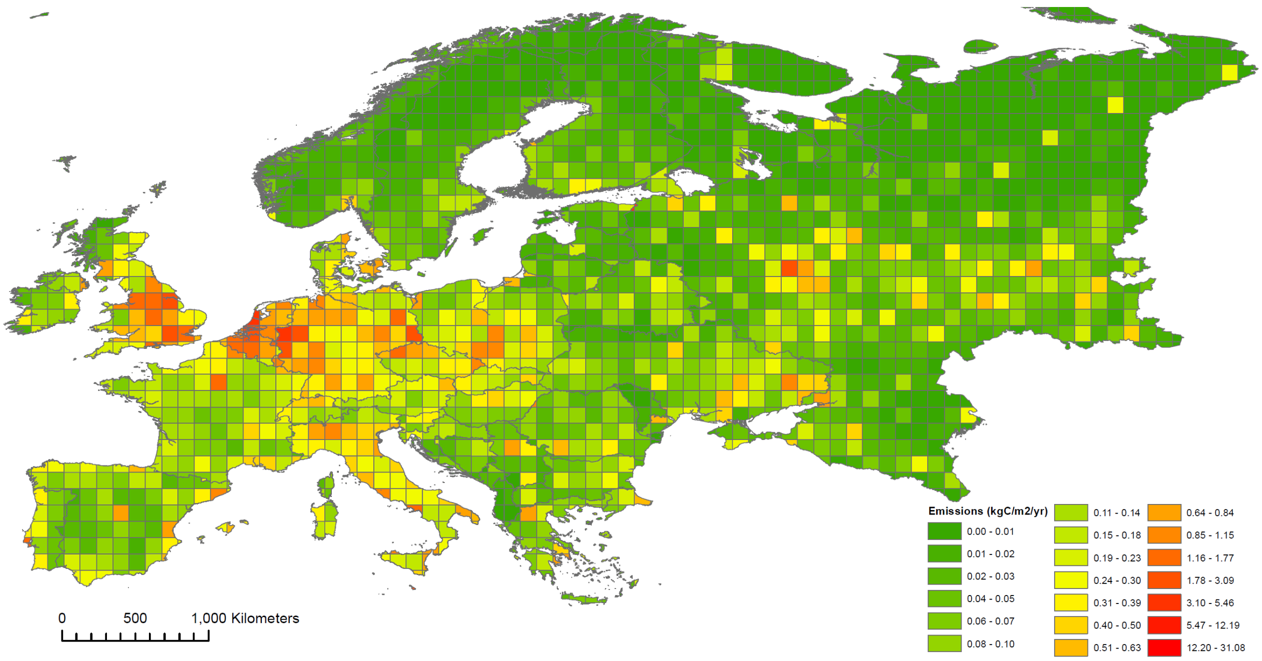
The sizable and significant effect following the Rio Summit can be illustrated by plotting the yearly estimates of the effect of diversity on per-capita CO2 separately for wealthy and non-wealthy economies (i.e., by plotting the β coefficients for the years 1970-2012 from equation 2). As shown in Figure 2, the point estimate for wealthy economies is characterized by a mild increase between 1970 and 1991, after which it experiences a sizable increase due to the Rio Summit. Conversely, the point-estimate for non-wealthy economies oscillates around 0 and is insignificant for the most part of the period.

3.3 Subnational Analysis

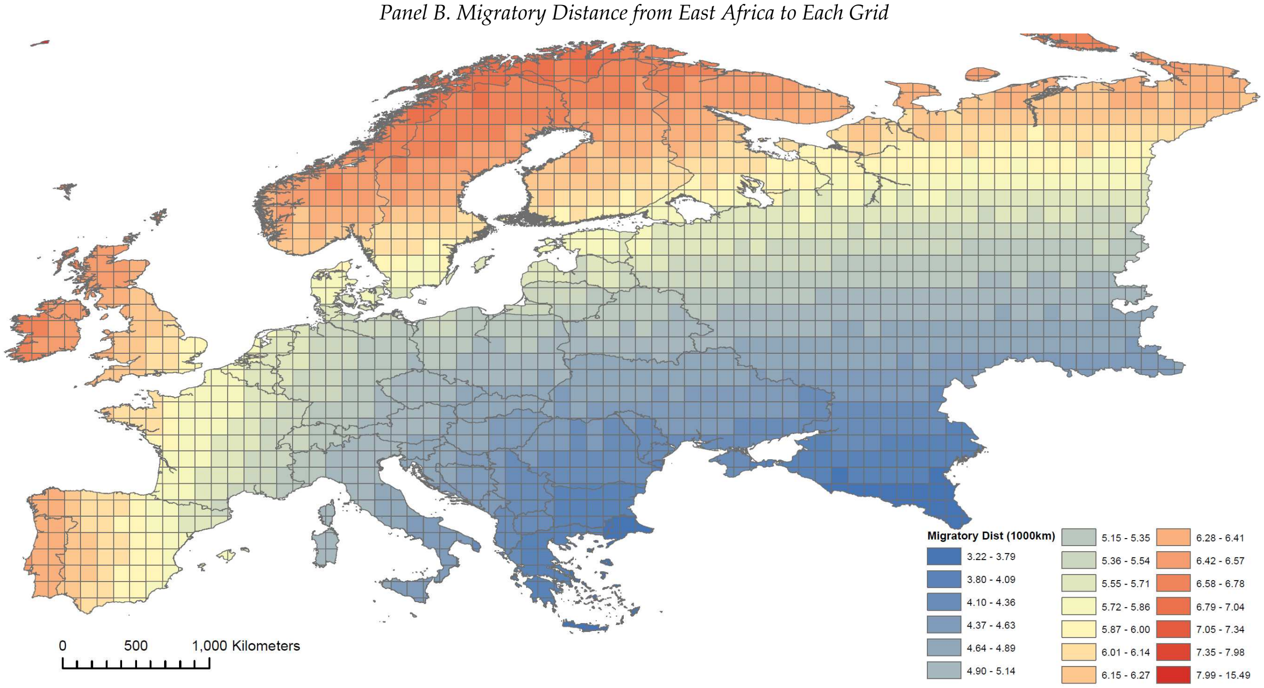
Up until this point the document has unveiled a significant, robust and causal effect of population diversity on carbon emissions for the set of wealthy economies. A relevant question that follows is whether such relation holds exclusively at a macro-level, or whether it may be found at a finer granularity. Answering such question poses a different set of empirical challenges, as subnational-level data for both the outcome and the independent variables become a must. This is specially challenging when it comes to diversity, as there are no global measures of population diversity at a subnational level that could promptly enable a direct and consistent test of the relation at a finer level of observation.

Figure 3: Subnational Data for Europe

Panel A. Emissions at the Grid Level



Panel B. Migratory Distance from East Africa to Each Grid



Note: These figures depict the spatial distribution of emissions from fossil fuels and migratory distance from East Africa in Europe. The continent was divided in artificial grids of 100km x 100km. Source: Carbon Emissions from Fossil Fuels come from the Fossil Fuel Data Assymilation System (FFDAS) as developed by Asefi-Najafabady et. al. (2014).

Notwithstanding this challenge, one may exploit the theoretical underpinnings of Ashraf and Galor's population diversity when proxying for it. Specifically, note that Population Diversity was constructed by projecting measured diversity with an adjusted measure of migratory distance from East Africa, provided the tight inverse relation between these variables. Hence, proxying diversity with migratory distance from East Africa enables reduced-form estimates that may capture the effect of cohesion (or lack thereof) on emissions. Crucially, if diversity is driving emissions of high-income regions, one would expect a tight negative association between migratory distance and emissions at the grid level.

This approach, however, gives way to a new set of concerns that must be addressed empirically. Specifically, it is not possible to retrieve accurate average adjusted migratory distances to the centroid of all grids for those continents that received massive amounts of migrants and displaced people in the colonial and postcolonial era, as it is impossible to reconstruct the exact physical occupation from such incoming population at a very fine level of granularity. This implies that America and Oceania are not well suited for an investigation of the relation between diversity and carbon emissions through the proposed proxy strategy. Analogously, the lack of knowledge on the exact pattern of African occupation by the homo sapiens, which is particularly sensible to data of the precise site(s) in which the species emerged, impede a use of migratory distance as a proxy within such continent. This leaves only two of the three 'Old World' continents as candidates for the empirical examination, namely Europe and Asia.

Considering the overarching argument of the document, Europe arises as the best candidate to examine the subnational relation between migratory distance and carbon emissions. As opposed to Asia, Europe is a high-income region with relatively high quality and less heterogenous institutions. Hence, the empirical examination proceeds by focusing on the latter, and subdividing it into grids of 100km x 100km. To seek consistent results with the initial cross-national results, the data examined corresponds to the year 2000. Figure 3 illustrates the geographical distribution of carbon emissions from fossil fuels per square meter, which points to their responsiveness to the distribution of economic activity within the continent.

In examining the impact of diversity on emissions at this level of granularity, however, it is crucial to note that average emissions per squared meter (instead of per capita measures of emissions) arise as the key outcome variable to examine. This follows from potential economies of scale in the usage of energy resources from both individuals and firms, which mechanically would lead to a larger (and misleading) emissions per capita for those grids with low population. Consider, for example, the per capita emissions of two grids that starkly differ in their population, but that are otherwise inhabited by people undertaking the same actions and choices. Provided economies of scale in the usage/consumption of energy, the per capita measure of emissions would misleadingly indicate that the grid with low population has a higher proclivity towards contamination, when in fact the behavior pertaining individual-level emissions would be identical. The empirical assessment that follows thus examines the relation between Migratory Distance from East Africa and average emissions per square meter:

$$ln(CO2)_{i,t} = \alpha + \beta ln(MigratoryDist)_i + \psi ln(luminosity)_i + \vartheta \mathbf{X}_i + \varepsilon_{i,t} \qquad (5)$$

As noted, here the unit of observation i corresponds to a grid of 100km x 100km within Europe, and ln(CO2) corresponds to average emissions per squared meter, although an alternative specification focusing in per capita emissions yields qualitatively identical results (see table H in the appendix). Further, ln(Migratory Distance) is the distance from East Africa to the centroid of the grid, provided a geographical path that mimics that of the homo sapiens into Europe. Such specification also accounts for economic activity as proxied by luminosity of nightlights (Henderson et. al., 2012), population, and a complete set of geographical covariates including temperature, precipitation, absolute latitude, ruggedness, wind, and distance to coast. Table G in the appendix documents the robustness of the results if an alternative measure of migratory developed by Galor and Klemp (2017)[2] is employed .

[2]I thank Oded Galor and Marc Klemp for facilitating the algorithm with which such accurate distances where computed.

Table 8: Effect of Migratory Distance on Carbon Emissions at a Subnational Level

Dependent Variable: ln(Kilograms of Carbon Emissions per squared meter in 2000)				
	(1)	(2)	(3)	(4)
VARIABLES	OLS	OLS	OLS	OLS
ln(migratory distance from East Africa)	-0.453**	-0.617***	-0.273***	-0.457***
	(0.175)	(0.089)	(0.082)	(0.168)
ln(light intensity)			0.059***	0.034***
			(0.007)	(0.003)
Population				0.039***
				(0.042)
Country FE	No	Yes	Yes	Yes
Geographical Cont.	No	No	No	Yes
Observations	2,954	2,954	2,954	2,954
R-squared	0.041	0.288	0.363	0.431

Robust standard errors clustered at the country level in parentheses. Unit of observations: Grids of 100km x 100km. Grids with refineries were excluded. Geographical controls include absolute latitude, temperature, ruggedness, distance to coast, precipitation, area, and wind. *** p<0.01, ** p<0.05, * p<0.1

Note: Using OLS regressions at the level of artifical grids (100km x 100km), this table demonstrates that the positive effect of Diversity on emissions in rich economies holds at a subnational level, considering the strong documented association between Population Diversity and migratory distance from East Africa. Carbon Emissions from Fossil Fuels come from the Fossil Fuel Data Assymilation System (FFDAS) as developed by Asefi-Najafabady et. al. (2014). Country FE includes fixed effects for all European countries. Geographical Controls include Geographical controls include absolute latitude, temperature, ruggedness, distance to coast, precipitation, area, and wind. Heteroskedasticity robust standard errors clustered aat the country level reported in parentheses. *** denotes p<0.01, ** p<0.05, and * p<0.1

The results, contained in Table 8, provide further credence to the hypothesis maintained throughout the document, as the migratory distance to each grid exhibits a robust negative relation with emissions from fossil fuels, even after the inclusion of country fixed-effects, along with a complete set of geographical controls. As shown in Table I in the Appendix, this empirical result is not explained through the effect of migratory distance on regional specialization on polluting activities (as in Depetris-Chauvin and Özak, 2017), as it survives the inclusion of the share of regional economic production that comes from industrial activities when examining data at the NUTS 2 level within Europe. This, along with the tight inverse relation between migratory distance and population diversity, further supports the idea that cohesion locally affects the capacity of regions to abate emissions in high-income regions, thereby leading to the established aggregate relation between diversity and CO_2 pollution.

A concern arising from the results above is that migratory distance may be capturing other spatial confounders that are not related to diversity, and are thus a result of hidden factors unrelated to the main argument maintained throughout this document. One of such potential spatial confounders, for example, would be given by the sensitivity of trade to distance -as provided by iceberg costs, for example-. Table 9 addresses such concern by examining the relation between emissions and the distance from various sites to the centroid of each grid. Specifically, it includes the aerial distance from Addis Ababa, which despite being correlated to migratory distance from East Africa, fails to capture all relevant information relative to the exodus of the homo sapiens from Africa, which by contrast is incorporated in the computation of migratory distance. Reassuringly, the aerial distances from different locations appear to be insignificant when explaining emissions, which provides further support to the validity of the proxy strategy employed in this section and thus to the overarching argument of the document.

Table 9: Falsification Test

	Dependent Variable: ln(Kilograms of Carbon Emissions per squared meter in 2000)				
	(1)	(2)	(3)	(4)	(5)
	OLS	OLS	OLS	OLS	OLS
VARIABLES	East Africa - Migratory	East Africa - Aerial	Mexico - Aerial	London - Aerial	Tokyo - Aerial
ln(distance)	-0.457***	-0.223	0.175	-0.034	-0.056
	(0.168)	(0.210)	(0.290)	(0.029)	(0.196)
ln(light intensity)	0.034***	0.034***	0.034***	0.033***	0.034***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Population	0.039***	0.039***	0.039***	0.039***	0.039***
	(0.042)	(0.042)	(0.043)	(0.044)	(0.043)
Country FE	Yes	Yes	Yes	Yes	Yes
Geographical Cont.	Yes	Yes	Yes	Yes	Yes
Observations	2,954	2,954	2,954	2,954	2,954
R-squared	0.551	0.550	0.550	0.551	0.551

Note: Using OLS regressions at the level of artifical grids (100km x 100km), this table demonstrates that the proxy for Diversity, migratory distance from East Africa, has an effect on emissions that are not observable on other measures of distance that are unrelated to the exodus of the homo sapiens from East Africa and thus carry little effect on Diversity. Carbon Emissions from Fossil Fuels come from the Fossil Fuel Data Assymilation System (FFDAS) as developed by Asefi-Najafabady et. al. (2014). Country FE includes fixed effects for all European countries. Geographical Controls include Geographical controls include absolute latitude, temperature, ruggedness, distance to coast, precipitation, area, and wind. Heteroskedasticity robust standard errors clustered aat the country level reported in parentheses. *** denotes p<0.01, ** p<0.05, and * p<0.1

4 Mechanisms

As argued throughout the document, lack of cohesion -as measured by population diversity- hampers the ability of societies to tackle climate change due to its negative effect on coordination and co-operation. Conversely, altruism or prosociality do not constitute necessary channels through which diversity operates; the noxious effects of emissions are globally pervasive, and by focusing on high-income regions we de facto excluding those countries for which such marginal cost is below the marginal benefit of massively emitting carbon (and for which, as shown above, the effects are insignificant). A natural step in corroborating the relevance of coordination and cooperation would thus consist in examining whether indeed one observes a negative legacy of diversity on trust and on preference heterogeneity -both of which critically affect the proposed mechanism-. In doing so, it is also important to examine whether empirically accounting for such chanels reduces the economic and statistical predictive power of Population Diversity.

This section adresses this issue by examining second generation migrants whose parents come from the same country in the European Social Survey, and examining the relation of their ancestry's Population Diversity and their responses. At a first instance, the noxious effect of such variable on trust is tested by looking at its relation to the questions “Would you say that most people can be trusted, or that you can't be too careful in dealing with people?” and “Would you say that most of the time people try to be helpful or that they are mostly looking out for themselves?”. Both of these questions were answered on a 0-10 scale, with 10 being a strong yes to both trust in people and in their willingness to help. As shown in columns 1-4 in Table 10, Population Diversity from the country of origin is significantly and robustly associated with lower trust and lower belief in others' helpfulness, proving the critical noxious effect that diversity may have on cooperation.

Further, this issue maps into a lack of trust in multilateral organisms, as shown by the negative and robust relation between ancestry's diversity and the answers to the question “Please tell me on a score of 0-10 how much you personally trust the United Nations” (Columns 5-6). The latter entails a lack of trust in the most emblematic multilateral organism, and the one responsible for facilitating action against climate change. Hence, the negative effect of diversity on cooperation is both local and global.

Table 10: Effect of Population Diversity on Trust

Effect of Ancestry's Diversity on Trustworthiness in European Social Survey Responses from Second Generation Migrants - Both Parents From Same Country of Origin						
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	OLS	OLS	OLS
	People are to be trusted		People are Helpful		Trust in UN	
	0-10 Scale	Dummy	0-10 Scale	Dummy	0-10 Scale	Dummy
Population Diversity	-5.792**	-1.114*	-6.324***	-0.759**	-9.826***	-1.451***
	(2.778)	(0.585)	(1.260)	(0.314)	(2.156)	(0.346)
Individual Contr.	Yes	Yes	Yes	Yes	Yes	Yes
Origin Country Contr.	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Survey-Round FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22,145	22,145	22,060	22,060	19,438	19,438
R-squared	0.083	0.065	0.089	0.065	0.121	0.096

Note: Using OLS regressions to examine responses in the European Social Survey from second generation migrants, this table shows the persistent effect of Population Diversity on mistrust both on peers and on multilateral organisms. Second generation migrants whose parents come frome the same country are considered. Individual controls are respondents' age, age squared, a dummy for being single, and years of education. Controls for country of origin are latitude, precipitation, roughedness and roughedness squared, elevation and elevation squared, and dummies for island and landlocked, log gdp and log gdp squared. All specifications account for country and survey-round fixed effects. Hetetoskedasticity robust standard errors clustered at the country level are reported in parentheses. *** denotes p<0.01, ** p<0.05, and * p<0.1

Cooperation and coordination are also negatively affected by the impact that population diversity has on heterogeneity of political and environmental preferences. Such heterogeneity can be cap-

Table 11: Effect of Population Diversity on Preference Heterogeneity

Effect of Diversity in Heterogeneity of Environmental and Political Preferences Standard Deviation in Responses From Second Generation Migrants (Both Parents From Same Country of Origin)						
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	OLS	OLS	OLS
	Standard Deviation in Reported Concern Over the Environment by Country of Origin			Standard Deviation in Left-Right Political Inclination by Country of Origin		
Population Diversity	1.738***	1.415**	1.093*	5.187***	3.719**	3.971**
	(0.532)	(0.615)	(0.630)	(1.392)	(1.703)	(1.800)
Geographical Cont.	No	Yes	Yes	No	Yes	Yes
Weights in Regression	Proportional to number of respondents	Proportional to number of respondents	Null weight to countries with less than 20 respondents	Proportional to number of respondents	Null weight to countries with less than 20 respondents	OLS - More than 20 respondents
Observations	136	136	87	136	136	84
R-squared	0.074	0.240	0.217	0.094	0.170	0.171

Note This table shows the results of OLS estimations with different weights to demonstrate the legacy of Population Diversity in increased heterogeneity over both political and environmental preferences. Heterogeneity in preferences over such dimensions is captured by computing the standard deviation in responses measutring concern over the environment and left-right political inclination. Regressions reported in columns 1-2 and 4-5 weight each of the country-of-origin observations proportionally to the number of respondents with such ancestry. Regressions reported in columns 3 and 6 grant the same weight to all observations, but only considers those observations with more than 20 respondents. Geographical controls include terrain's ruggedness and its square, absolute latitude, dummies for landlock and island, temperature, precipitation variability, average elevation and its squared, and indicators for landlocked and island countries. Heteroskedasticity robust standard errors reported in parentheses. *** denotes p<0.01, ** p<0.05, and * p<0.1

tured by calculating the variability in responses from people sharing common country of ancestry. Specifically, heterogeneity may be captured by calculating the standard deviation in the responses of second generation migrants, for each country of origin, to questions about their political inclination (left-right on a 0-10 scale), and about their ideological similarity to people who care about the environment ("very much like me"–"not like me at all" on a 0-6 scale). Hence, if the mechanism set forth by this document were to hold, the diversity from each country should exhibit a positive relation with the variability in the responses of subjects with ancestry in such countries.

As shown in Table 11, the positive effect of diversity on the heterogeneity of political and environmental preferences show up in the data -both when doing a weighted regression and when excluding countries of origin with few respondents. Further, the relation survives after the inclusion of geographical controls from the countries of origins, which may systematically affect the cultural legacies transmitted by parents to their children.

All in all, diversity appears to have a determinant role in explaining a culture of mistrust (both on fellow citizens and on multilateral organisms) and on preference-heterogeneity (both political and relative to environmental concerns). A final step in corroboratin mistrust and preference-heterogeneity as mechanisms through which Population Diversity affects emissions would thus consist in accounting for proxies of these two dimensions in emprirical specifications examining such relation for

Table 12: Corroborating Cooparation and Coordination as Mechanisms

	(1) High Income Countries OLS	(2) High Income Countries OLS	(3) High Income Countries OLS	(4) High Income Countries OLS	(5) High Income Countries OLS	(6) High Income Countries OLS	(7) High Income Countries OLS	(8) High Income Countries OLS	(9) High Income Countries OLS	(10) High Income Countries OLS	(11) High Income Countries OLS
	Interpersonal Trust			Trust in Multilateral Organisms			Heterogeneity in Environmental Preferences			All Mechanisms	
	Average Reported Trust in Other People (Trust)	Log(CO2 Emissions per Capita)		Average Reported Trust in the United Nations (Trust UN)	Log(CO2 Emissions per Capita)		Standard Deviation in Reported Concern Over the Environment (Std. Environmt)	Log(CO2 Emissions per Capita)		Log(CO2 Emissions per Capita)	
Population Diversity	-10.01***	8.092***	7.170**	-11.90***	8.083***	7.077**	2.242*	8.083***	6.771**	6.219**	5.612*
	(3.271)	(2.780)	(2.831)	(4.149)	(2.787)	(3.200)	(1.318)	(2.787)	(2.666)	(2.762)	(2.893)
Trust			-0.092							-0.061	-0.013
			(0.089)							(0.092)	(0.121)
Trust UN						-0.085					-0.086
						(0.102)					(0.113)
Std. Environment									0.585*	0.561*	0.589*
									(0.322)	(0.325)	(0.353)
Log (GDP per capita)	0.286***	0.569***	0.595***	0.181	0.569***	0.585***	-0.012	0.569***	0.577***	0.594***	0.596***
	(0.093)	(0.079)	(0.083)	(0.154)	(0.079)	(0.080)	(0.030)	(0.080)	(0.076)	(0.080)	(0.079)
Democracy (Polity IV - Extent)	0.024	-0.057**	-0.055**	0.030	-0.058**	-0.055*	-0.002	-0.058**	-0.057**	-0.055*	-0.054**
	(0.027)	(0.027)	(0.027)	(0.047)	(0.028)	(0.029)	(0.011)	(0.028)	(0.027)	(0.026)	(0.026)
Schooling (Average years of)	0.083***	0.091**	0.098**	-0.028	0.091**	0.089**	-0.010	0.091**	0.097***	0.102**	0.096**
	(0.030)	(0.036)	(0.038)	(0.040)	(0.036)	(0.036)	(0.010)	(0.036)	(0.036)	(0.038)	(0.041)
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	87	87	87	86	86	86	86	86	86	86	86
R-squared	0.386	0.659	0.662	0.277	0.658	0.662	0.079	0.658	0.674	0.676	0.679

Note This table shows the results of OLS estimations with different weights to demonstrate the legacy of Population Diversity in increased heterogeneity over both political and environmental preferences. Heterogeneity in preferences over such dimensions is captured by computing the standard deviation in responses measutring concern over the environment and left-right political inclination. Regressions reported in columns 1-2 and 4-5 weight each of the country-of-origin observations proportionally to the number of respondents with such ancestry. Regressions reported in columns 3 and 6 grant the same weight to all observations, but only considers those observations with more than 20 respondents. Geographical controls include terrain's ruggedness and its square, absolute latitude, dummies for landlock and island, temperature, precipitation variability, average elevation and its squared, and indicators for landlocked and island countries. Heteroskedasticity robust standard errors reported in parentheses. *** denotes p<0.01, ** p<0.05, and * p<0.1

sufficiently-rich economies. Table 12 moves in such direction by examining the effect of including such covariates on the estimated effect of Population Diversity on carbon emissions. Should these mechanisms be relevant, one would observe reductions in the econonomic and statistical estimated effect of Population Diversity.

The results of Table 12 show that there is indeed a diminishing of the importance of Diversity as a driver of carbon pollution when accounting for mistrust on peers, mistrust on multilateral organisms, and heterogeneity in environmental preferences. Columns 2-3 and 5-8 show that, after accounting for mistrust, the effect of a one-percent increase in Diversity on emissions falls by nearly 0.9 percent. Analogously, Columns 8-9 show a decrease of nearly 1.2 percentage points in the effect of a one-percent increase in Diversity after accounting for heterogeneity in environmental preferences. Notably, when simultaneously accounting for the three mechanisms as in Column 11, the effect of Population Diversity becomes only marginally significant and the economic impact of a one percent increase of this variable falls by nearly 1.4 percentage points. This provides strong support to the claim that Diversity's adverse effect on carbon emissions materializes through reduced cooperation and coordination.

5 Conclusion

This document unveils the significant role of social cohesion in determining the cross-country variation in carbon-emissions. Exploiting a measure of population diversity developed by Ashraf and Galor (2013), which measures lack of cooperation and coordination within a country, this paper documents a robust positive effect of lack of cohesion on the emissions of wealthy countries. Further, this relation seems to be causal, as demonstrated by an instrumental analysis that exploits the exogenous nature of the migratory distance from East Africa in the exodus of the homo sapiens from such continent. The results of a repeated cross-section corroborate the above, demonstrating that diversity became relevant precisely after there was global common knowledge of the responsibility of humans in the making of a highly CO2-concentrated atmosphere.

Exploiting a second layer of analysis, the document also shows that the relation between cohesion and emissions is present at a subnational level. This is appears to be the case after examining the robust negative effect of migratory distance from East Africa on average emissions from fossil fuels at a grid level in Europe. The result, which holds only for migratory distance but not for aerial distances from various sites, further corroborate the strong link between migratory distance and diversity.

Finally, the document provides credence to lack of coordination and cooperation as the mechanisms that explain the negative effect of diversity on anthropogenic carbon emissions by examining responses from second generation migrants in Europe. Crucially, population diversity appears to explain a culture of mistrust and of heterogenous preferences, which maps into lack of trust on multilateral organisms -those responsible of leading and enforcing climate action-, and into increased heterogeneity relative to environmental issues. By proving the empirical relevance of the social dimension, this document thus complements the environmental economics literature and suggests that a comprehensive strategy aimed at curbing carbon emissions must not disregard cohesiveness and more broadly social capital.

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Appendix

Table A - Summary Statistics

Summary Statistics					
Variable	Mean	Std.	Min	Max	N
Cross-Country					
Log (CO2 per capita in 2000)	0.384	1.753	-4.078	3.331	141
Log (GDP per capita)	7.471	1.584	4.821	10.540	141
Population Diversity	0.727	0.027	0.628	0.774	141
Ethnic Fractionalization	0.472	0.253	0.002	0.930	141
Ethnolinguistic Fractionalization	0.472	0.305	0.001	0.965	141
Polarization Index	0.114	0.061	0.000	0.239	141
Cultural Divisiveness	0.315	0.209	0.000	0.733	141
Religious Fractionalization	0.445	0.230	0.004	0.860	141
Oil Revenues (Share of GDP)	0.251	2.347	0.000	26.667	129
Democracy (Polity IV - Extent)	4.249	3.684	0.000	10.000	129
Schooling (Average years of)	5.255	3.095	0.409	12.100	129
Scientific Articles (Per thousand)	0.109	0.219	0.000	0.975	129
Trade (Share of GDP)	80.630	46.903	19.820	366.071	129
Ethnic Inequality (Alesina et. al., 2017)	0.464	0.316	0.000	0.982	129
Urbanization (% living in cities)	54.247	23.145	8.246	100.000	129
Population (in millions)	43.026	147.425	0.548	1262.645	129
Abslotue Latitude	28.174	17.315	1.000	64.000	129
Island	0.132	0.340	0.000	1.000	129
Landlocked	0.256	0.438	0.000	1.000	129
Temperature	290.245	8.517	266.169	301.459	129
Precipitation Variabillity	60.427	30.635	11.523	144.330	129
Ruggedness	0.199	0.170	0.013	1.242	129
Elevation	623.288	564.872	37.275	2983.332	129
Subnational - Europe					
ln(Carbon Emissions per squared meter in 2000)	-1.403	0.412	-5.846	3.443	2,954
ln(migratory distance from East Africa)	4.030	0.184	3.450	4.401	2,954
ln(migratory distance, Galor & Klemp, 2017)	4.029	0.230	3.473	5.043	2,954
ln(light intensity)	1.391	2.223	-4.605	4.605	2,954
Population	0.175	0.460	0.000	9.445	2,954
Latitude	55.239	9.646	35.000	75.000	2,954
ln(Ruggedness)	10.121	2.799	-4.605	13.928	2,954
ln(Distance to Coastline)	9.990	2.931	-2.062	14.306	2,954
Temperature	6.156	5.662	-11.253	19.463	2,954
Precipitation Variability	3.815	5.504	0.000	49.882	2,954
Wind Speed	3.950	1.337	1.240	11.167	2,954
ln(Area)	2.323	3.577	-9.757	6.415	2,954
European Social Survey					
People can be trusted	5.024	2.429	0.000	10.000	22,145
People can be trusted (dummy)	0.641	0.480	0.000	1.000	22,237
People are helpful	4.882	2.408	0.000	10.000	22,060
People are helpful (dummy)	0.606	0.489	0.000	1.000	22,237
Trust in UN	4.853	2.720	0.000	10.000	19,438
Trust in UN (dummy)	0.662	0.473	0.000	1.000	19,438
Age	47.316	17.885	13.000	114.000	22,237
single	0.245	0.430	0.000	1.000	22,237
Years of Education	12.549	4.185	0.000	56.000	22,237
Std - Concern over the Environment	1.011	0.286	0.000	1.826	136
Std - Left-Right Political Inclination	2.073	0.658	0.000	5.132	136

Table B

Results using Alternative Definitions of High vs Low Income

Dependent Variable: Log CO2 per capita in 2000

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	IV - 2SLS	OLS	IV - 2SLS	OLS	IV - 2SLS	OLS	IV - 2SLS
	High Income (Alternative Definitions)				Low Income (Alternative Definitions)			
Population Diversity	7.164**	11.34**	7.589**	13.77***	-4.728	-4.284	-7.568	-6.113
	(3.575)	(5.365)	(2.984)	(4.604)	(5.141)	(2.869)	(9.123)	(7.567)
Log (GDP per capita)	0.607***	0.586***	0.203	0.215*	-0.315	-0.319**	0.679**	0.688***
	(0.170)	(0.142)	(0.140)	(0.115)	(0.224)	(0.129)	(0.295)	(0.199)
Oil Revenues (Share of GDP)	-0.722	-1.061	0.032**	0.028***	0.084***	0.084***	-0.577	-0.708
	(1.542)	(1.365)	(0.015)	(0.010)	(0.012)	(0.007)	(1.162)	(0.765)
Democracy (Polity IV - Extent)	-0.011	-0.008	-0.019	-0.016	-0.364***	-0.365***	-0.224***	-0.221***
	(0.028)	(0.024)	(0.021)	(0.017)	(0.063)	(0.036)	(0.071)	(0.046)
Schooling (Average years of)	0.068	0.067	0.103*	0.103**	-0.105	-0.108**	0.300**	0.294***
	(0.062)	(0.049)	(0.057)	(0.046)	(0.076)	(0.043)	(0.109)	(0.074)
Scientific Articles (Per thousan	-0.644	-0.645	0.266	0.0829	17.78	17.64***	-13.29	-14.68
	(0.590)	(0.460)	(0.594)	(0.478)	(11.53)	(6.660)	(19.13)	(13.28)
Trade (Share of GDP)	-0.001	0.000	0.001	0.001	-0.006**	-0.006**	-0.004	-0.004
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.003)	(0.002)
Ethnic Inequality (Alesina et. al	-0.098	-0.032	-0.290	-0.156	-1.386***	-1.395***	-0.617*	-0.613**
	(0.291)	(0.240)	(0.263)	(0.216)	(0.282)	(0.160)	(0.350)	(0.241)
Urbanization (% living in cities	0.010	0.010	0.004	0.004	0.049**	0.050**	0.018	0.019**
	(0.009)	(0.007)	(0.006)	(0.004)	(0.009)	(0.005)	(0.012)	(0.009)
Population (in millions)	0.000	0.000	0.000	0.000	0.003***	0.003***	0.002***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sample	> 35th percentile	> 35th percentile	World Bank - High Inc	World Bank - High Inc	< 35th percentile	< 35th percentile	World Bank - High Inc	World Bank - High Inc
GDP Composition	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Legal Origins FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	87	87	75	75	42	42	54	54
R-squared	0.830	0.826	0.855	0.844	0.988	0.988	0.926	0.926
1st Stage F-Statistic (K-P)	-	13.876	-	18.498	-	2730.93	-	310.94

Note: Using OLS and 2SLS regressions, this table demonstrates the robustness of the positive effect of Population Diversity on Carbon Emissions in sufficiently rich countries when alternative High vs Low income categorizations (World Bank and 35th percentile). Continental FE controls for belonging to either America, Africa, Asia, Europe or Oceania. Legal Origins FE indicates whether the country has its legal structure founded on either the British, French, German, Scandinavian or Socialist antecedent. Geographical controls include terrain's ruggedness and its square, absolute latitude, temperature, precipitation variability, average elevation and its squared, and indicators for landlocked and island countries. GDP Composistion includes the share of output that corresponds to agriculture, industry and services. Columns (2), (4), (6) and (8) instrument Population Diversity using undajusted Migratory Distance from Addis Ababa. Heteroskedasticity robust standard errors are reported in parentheses. *** denotes p<0.01, ** p<0.05, and * p<0.1

Table C

Including Income as a Covariate to Dummy Specification Dependent Variable: Log CO2 per capita in 2000				
	(1) OLS	(2) OLS	(3) OLS	(4) OLS
Population Diversity*(High Income)	19.65***	12.57***	11.08**	11.58**
	(3.825)	(4.678)	(4.639)	(4.649)
Population Diversity	-8.171***	-1.019	-3.894	-3.902
	(2.923)	(4.426)	(4.465)	(4.951)
High Income	-13.07***	-8.137**	-7.698**	-8.105**
	(2.656)	(3.183)	(3.214)	(3.211)
ln(GDP per capita in 2000)	0.580***	0.594***	0.900***	0.772***
	(0.071)	(0.070)	(0.114)	(0.152)
Oil Revenues (Share of GDP)			0.026***	0.029**
			(0.010)	(0.012)
Democracy (Polity IV - Extent)			-0.036	-0.036
			(0.024)	(0.022)
Schooling (Average years of)			0.177***	0.155***
			(0.052)	(0.058)
Scientific Articles (Per thousand)			-2.040***	-1.862***
			(0.547)	(0.558)
Trade (Share of GDP)				0.010
				(0.007)
Ethnic Inequality (Alesina et. al., 2017)				0.001
				(0.001)
Urbanization (% living in cities)				-0.121
				(0.273)
Population (in millions)				0.001**
				(0.000)
GDP Composition	No	No	Yes	Yes
Continental FE	No	Yes	Yes	Yes
Geographical Controls	No	No	Yes	Yes
Legal Origins FE	No	No	Yes	Yes
Observations	128	128	128	128
R-squared	0.778	0.807	0.901	0.906

Note: Using OLS regressions, this table demonstrates the robustness of the positive relation between Diversity of High Income countries and emissions to the inclusion of log(GDP) as a covariate in the dummy-specification in equation (3). High Income countries are defined as per World Bank's categorization. Continental FE controls for belonging to either America, Africa, Asia, Europe or Oceania. Legal Origins FE indicates whether the country has its legal structure founded on either the British, French, German, Scandinavian or Socialist antecedent. Geographical controls include terrain's ruggedness and its square, absolute latitude, temperature, precipitation variability, average elevation and its squared, and indicators for landlocked and island countries. GDP Composistion includes the share of output that corresponds to agriculture, industry and services. Heteroskedasticity robust standard errors reported in parentheses. *** denotes p<0.01, ** p<0.05, and * p<0.1

Table D

Renewable Energy with Dummy Specification Dependent Variable: Percentage of Energy coming from Renewable Sources (2000 C.E)				
	(1) OLS	(2) OLS	(3) OLS	(4) OLS
Population Diversity*(High Income)	-0.277**	-0.305**	-0.307**	-0.299**
	(0.128)	(0.136)	(0.139)	(0.146)
Population Diversity	-1.356	0.094	0.542	0.628
	(0.885)	(1.207)	(1.243)	(1.336)
High Income	-0.050	-0.090	-0.105	-0.097
	(0.071)	(0.073)	(0.076)	(0.077)
Democracy (Polity IV - Extent)				-0.004
				(0.012)
Schooling (Average years of)				-0.004
				(0.019)
Scientific Articles (Per thousand)				-0.013
				-0.213
Continental FE	No	Yes	Yes	Yes
Legal Origins FE	No	No	Yes	Yes
Observations	129	129	129	129
R-squared	0.118	0.160	0.193	0.195

Note: Using OLS regressions and following an analogous specification to that of equation (3), this table shows the consistent adverse effect that Diversity of High-Income Countries has on the use of renewable sources of energy. High Income corresponds to those above the 30th percentile in the global income distribution. Continental FE controls for belonging to either America, Africa, Asia, Europe or Oceania. Legal Origins FE indicates whether the country has its legal structure founded on either the British, French, German, Scandinavian or Socialist antecedent. Geographical controls include terrain's ruggedness and its square, absolute latitude, temperature, precipitation variability, average elevation and its squared, and indicators for landlocked and island countries. GDP Composistion includes the share of output that corresponds to agriculture,

Table E

Prompt Ratification of Kyoto Protocol				
Dependent Variable: Dummy for having ratified the Kyoto Protocol within 6 Months (1-Yes, 0-No)				
	(1)	(2)	(3)	(4)
	Probit	Probit	Probit	Probit
Population Diversity*(High Income	-37.33***	-53.09***	-58.30***	-52.73**
	(8.808)	(10.65)	(20.22)	(20.65)
Population Diversity	17.91***	28.31***	22.75	14.85
	(6.652)	(9.796)	(16.97)	(17.33)
High Income	29.02***	39.78***	42.76***	38.91**
	(6.313)	(7.983)	(14.87)	(15.31)
Oil Revenues (Share of GDP)			-15.30**	-13.79**
			(6.458)	(6.669)
Democracy (Polity IV - Extent)				-0.146**
				(0.074)
Schooling (Average years of)				0.123
				(0.136)
Scientific Articles (Per thousand)				1.842
				(1.585)
GDP Composition	No	No	Yes	Yes
Continental FE	No	Yes	Yes	Yes
Legal Origins FE	No	No	Yes	Yes
Observations	114	114	114	114
R-squared	0.174	0.22	0.25	0.497

Using a probit model that follows an analogous specification as that of Eq. (3), this table shows an adverse effect of diversity of rich-countries on the undertaking of the Kyoto Protocol, which is consistent with the effect of Diversity on emissions. High Income corresponds to those countries above the 30th percentile in the global distribution of income. Continental FE controls for belonging to either America, Africa, Asia, Europe or Oceania. Legal Origins FE indicates whether the country has its legal structure founded on either the British, French, German, Scandinavian or Socialist antecedent. GDP Composition includes the share of output that corresponds to agriculture, industry and services. Heteroskedasticity robust standard errors in parentheses. *** denotes p<0.01, ** p<0.05, and * p<0.1

Table F

Introducing Income, Population, Urbanization as Covariates in Pooled Cross-Section					
Dependent Variable: (Log CO2 per Capita)i,t					
	(1)	(2)	(3)	(4)	(5)
	All Countries	All Countries	All Countries	All Countries	Non-Soviet
	OLS	OLS	OLS	OLS	OLS
Population Diversity*(High Income)i,t	1.020	3.386	-2.594	-0.527	-0.632
	(2.294)	(2.196)	(2.382)	(2.456)	(2.488)
Population Diversity*(High Income)i,t*(Pos-Rio)t			8.246***	7.205**	7.511**
			(2.760)	(3.002)	(2.996)
Log (GDP per capita)i,t	0.314***	0.301***	0.341***	0.331***	0.344***
	(0.046)	(0.039)	(0.046)	(0.041)	(0.045)
Populationi,t		0.002***		0.001***	0.001***
		(0.000)		(0.000)	(0.000)
Urbanizationi,t		0.013***		0.018***	0.017***
		(0.001)		(0.002)	(0.002)
Time FE	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes
Pop.Div*Time FE	No	No	No	Yes	Yes
Observations	5,516	5,516	5,516	5,516	5,123
R-squared	0.970	0.972	0.972	0.974	0.974

Note: Using Pooled OLS regressions, this table shows the robustnes of the effect of Diversity of rich countries on emissions, and its timing to be after it became common knowledge in the 1992 Earth Summit in Rio de Janeiro. (High Income)i,t is a time-varying dummy that takes the value of 1 at the year t in which country i has an income per capita greater than the income per capita corresponding to the 30th percentile of year 2000. (Post Rio)t takes the value of 1 when the observation corresponds to a year after 1991 (when notification and preparation for the summit began). The Non-Soviet sample involves all countries that were not either direct signatories of the Warsaw Pact or under the direct influence of the Soviet Union. Country FE and Time FE correspond to country and time fixed effects, respectively. Pop.Div*Time FE controls for the time-varying effect of diversity. The individual terms of all interactions are accounted for in each specification. Heteroskedasticity robust standard errors clustered at the country level in parentheses. *** denotes p<0.01, ** p<0.05, and * p<0.1

Table G

Robustness to Alternative Measures of Migratory Distance Dependent Variable: ln(Kilograms of Carbon Emissions per squared meter in 2000)				
	(1)	(2)	(3)	(4)
VARIABLES	OLS	OLS	OLS	OLS
ln(migratory distance from East Africa)	-0.289***	-0.493***	-0.190***	-0.348**
	(0.022)	(0.052)	(0.047)	(0.171)
ln(light intensity)			0.061***	0.030***
			(0.003)	(0.004)
Population				0.037***
				(0.004)
Country FE	Yes	Yes	Yes	Yes
Geographical Cont.	No	No	No	Yes
Observations	2,954	2,954	2,954	2,954
R-squared	0.283	0.362	0.425	0.428

Using OLS regressions at the level of artifical grids (100km x 100km), this table demonstrates the robustness of the effect of migratory distance on pollution by employing the distance consistent with the algorithm developed by Galor and Klemp (2017). Carbon Emissions from Fossil Fuels come from the Fossil Fuel Data Assymilation System (FFDAS) as developed by Asefi-Najafabady et. al. (2014). Country FE includes fixed effects for all European countries. Geographical Controls include Geographical controls include absolute latitude, temperature, ruggedness, distance to coast, precipitation, area, and wind. Heteroskedasticity robust standard errors reported in parentheses. *** denotes p<0.01, ** p<0.05, and * p<0.1

Table H

Robustness and Falsification using Carbon Emissions Per Capita instead of Carbon Emissions per Sq. Meter Dependent Variable: ln(Kilograms of Carbon Emissions per capita in 2000)				
	(1)	(3)	(4)	(5)
	OLS	OLS	OLS	OLS
VARIABLES	East Africa - Migratory	Mexico - Aerial	London - Aerial	Tokyo - Aerial
ln(distance)	-2.757**	-0.748	0.197	1.118
	(1.194)	(1.138)	(0.174)	(0.722)
ln(light intensity per capita)	0.468***	0.468***	0.468***	0.468***
	(0.048)	(0.048)	(0.048)	(0.048)
Population	-0.396***	-0.395***	-0.390***	-0.396***
	(0.042)	(0.042)	(0.043)	(0.042)
Country FE	Yes	Yes	Yes	Yes
Geographical Cont.	Yes	Yes	Yes	Yes
Observations	2,948	2,948	2,948	2,948
R-squared	0.882	0.882	0.882	0.882

Note: Using OLS regressions at the level of artifical grids (100km x 100km), this table demonstrates that the proxy for Diversity, migratory distance from East Africa, has an effect on emissions per capita that are not observable on other measures of distance that are unrelated to the exodus of the homo sapiens from East Africa and thus carry little effect on Diversity. Carbon Emissions from Fossil Fuels come from the Fossil Fuel Data Assymilation System (FFDAS) as developed by Asefi-Najafabady et. al. (2014). Country FE includes fixed effects for all European countries. Geographical Controls include Geographical controls include absolute latitude, temperature, ruggedness, distance to coast, precipitation, area, and wind. Heteroskedasticity robust standard errors clustered aat the country level reported in parentheses. *** denotes p<0.01, ** p<0.05, and * p<0.1

Table I

Subnational Results at the Nuts 2 Level				
Dependent Variable: ln(Kilograms of Carbon Emissions per squared meter in 2010)				
	(1)	(2)	(3)	(4)
VARIABLES	OLS	OLS	OLS	OLS
ln(migratory distance from East Africa)	-3.777**	-3.839***	-3.847***	-3.095***
	(1.838)	(1.471)	(1.465)	(1.187)
ln(gdp)		0.583***	0.720***	0.590***
		(0.062)	(0.121)	(0.094)
Industrial Activity (% of GDP)			-0.015	0.017
			(0.013)	(0.012)
Population (in millions)			-0.088	0.030
			(0.060)	(0.045)
Country FE	Yes	Yes	Yes	Yes
Geographical Cont.	No	No	No	Yes
Observations	244	244	244	244
R-squared	0.560	0.693	0.697	0.896

Note: Using OLS regressions at the NUTS 2 level, this table demonstrates the robust negative effect of migratory distance on subnational emissions, even after controlling for Industrial Activity. Geographical controls include absolute latitude, temperature, ruggedness, distance to coast, precipitation, area, and wind. Heteroskedasticity robust standard errors in parentheses. *** denotes p<0.01, ** p<0.05, and *p<0.1

Variable Description

Cross-Country Variables

- Log(CO2 p.c in 2000): Is the emission of Carbon Dioxide in metric tons per capita for the year 2000. Taken from the Carbon Dioxide Information Analysis Center at the Oak Ridge National Laboratory.

- Log(GDP pc in 2000): The log value of the per-capita value of the Gross Domestic Product, in current US Dollars, at a country level. Taken from the World Bank.

- Predicted Diversity Ancestry Adjusted: Is the Expected Heterozygosity for each country that is predicted by the relation between migratory distance from East Africa (adjusted by composition of population by region of ancestry) and the observed population diversities for indigenous populations across the globe. Taken from Ashraf, Quamrul, and Oded Galor (2013), "The 'Out of Africa' Hypothesis, Human Genetic Diversity, and Comparative Economic Development," American Economic Review, 103(1), pp. 1-46.

- Religious Fractionalization: Measures the religious heterogeneity of a country's population, measured as 1 minus de Herfindahl index of religious group shares. Taken from Alesina, A., A. Devleeschauwer, W. Easterly, S. Kurlat, R. Wacziarg (2003), "Fractionalization," Journal of Economic Growth, 8(2), pp. 155—194.

- Ethnic Fractionalization: Measures the ethnic heterogeneity of a country's population, measured as 1 minus de Herfindahl index of ethnic group shares. Taken from Alesina, A., A. Devleeschauwer, W. Easterly, S. Kurlat, R. Wacziarg (2003), "Fractionalization," Journal of Economic Growth, 8(2), pp. 155—194.

- Linguistic Fractionalization: Measures the linguistic heterogeneity of a country's population, measured as 1 minus de Herfindahl index of linguistic group shares. Taken from Alesina, A., A. Devleeschauwer, W. Easterly, S. Kurlat, R. Wacziarg (2003), "Fractionalization," Journal of Economic Growth, 8(2), pp. 155—194.

- Cultural Divisiveness: Measures is calculated by subtracting from 1 the linguistic resemblance of two individuals taken at random from a country. Taken from Fearon, James D (2003), "Ethnic and Cultural Diversity by Country", Journal of Economic Growth, 8(2), pp. 195-222.

- Polarization Index: Measures the ethnic polarization index as computed by Reynal-Querol. Taken from Reynal-Querol, Marta. "Ethnicity, Political Systems, and Civil Wars." Journal of Conflict Resolution, 2002, 46(1), pp. 29–54.

- Oil Revenues (Share of GDP): Value of gains from national export of oil, net of all costs, as a share of Gross Domestic Product. Taken from the World Bank.

- Democracy (Polity IV – Extent): Score ranging from 0 to 10 capturing the strength of democracy in the country. Taken from the Polity IV Project (Marshall et., al, 2014).

- Schooling (Avg. Years of): Average number of years of educational attainment in the country of interest. Taken from the United Nations Development Program portal.

- Scientific Articles: Measures the average number of scientific articles per thousand inhabitants. Taken from the World Bank.

- Trade (Share of GDP): Captures the value of imports and exports as a percentage of GDP. Taken from the World Bank.

- Ethnic Inequality: Measures the inequality in economic activity across ethnicities within a country. Taken from Alesina, A., S. Michalopoulos and E. Papaioannou (2016). "Ethnic Inequality," Journal of Political Economy, 124(2), pp. 428-288

- Urbanization: Captures the percentage of a country's inhabitants that live in cities. Taken from the World Bank.

- Population: Absolute number of inhabitants within a country. Taken from the World Bank.

- Ruggedness: Identifies topographic heterogeneity, averaging across grid cells that are not covered by water within a country. Taken from Nunn, Nathan, and Diego Puga (2012), "Ruggedness: The Blessing of Bad Geography in Africa." Review of Economics and Statistics, 94 (1), pp. 20–36.

- Temperature: Mean yearly temperature in countries for 1950–2000. Taken from WorldClim—Global Climate Data.

- Precipitation: Average precipitation within a country in millimeters for 1950-2000. Taken from WorldClim—Global Climate Data.

- Precipitation variability: Variation of yearly precipitation within the country for 1950–2000. Taken from WorldClim—Global Climate Data.

- Elevation: Average elevation of the country above sea level. Taken from WorldClim – Global Climate Data.

- Island dummy: Identifies whether a country shares a land border with another country or not. Taken from the CIA's World Factbook. Landlocked: Identifies whether a country shares a border with the ocean or not, as reported by the CIA's World Factbook.

- Legal Origins: A series of dummies capturing the origin of the country's legal system (French, Anglo, German, Scandinavian or Socialist). Taken from La Porta, Rafael, Florencio Lopez-de Silanes, Andrei Shleifer, and Robert Vishny (1999), "The quality of government", Journal of Law, Economics, and organization, 15(1), pp. 222–279

- GDP Composition: Variables capturing the sectorial composition (agriculture, industry, and services) of a country's economic activity. Taken from the World Bank.

Subnational Results in Europe

- ln(Migratory Distance): Measures the log value of the distance, in thousands of kilometers, that would have to be covered by humans from Addis Ababa to the centroid of each of the grids, conditional on a transit through Egypt, mimicking the exodus path of the Homo Sapiens from Africa.
- ln(Migratory Distance, Galor & Klemp 2017): Employs an algorithm developed by Galor and Klemp (2017) in calculating the migratory distance of the Homo Sapiens into all regions of the world, which capture potential effect in terms of effective distance of geographical accidents and water bodies.
- ln(Carbon Emissions per square meter, 2000): Captures the logarithm value of the average kilogram emissions of carbon emissions from fossil fuels per square meter in 2000 for each grid. Taken from the Fossil Fuel Data Assimilation System.
- ln(Carbon Emissions per square meter, 2010): Captures the logarithm value of the average kilogram emissions of carbon emissions from fossil fuels per square meter in 2010 for each grid. Taken from the Fossil Fuel Data Assimilation System.
- ln(light intensity): Captures the logarithm value of the averaging luminosity at night observations across pixels per grid. Taken from the National Oceanic and Atmospheric Administration, National Geophysical Data Center.
- Population: Captures the total number of inhabitants for each grid for 2000. Taken from Center for International Earth Science Information Network, Columbia University.
- Ruggedness: Identifies topographic heterogeneity, averaging across grid cells that are not covered by water within a country. Taken from Nunn, Nathan, and Diego Puga (2012), "Ruggedness: The Blessing of Bad Geography in Africa." Review of Economics and Statistics, 94 (1), pp. 20–36.
- Temperature: Mean yearly temperature in countries for 1950–2000. Taken from WorldClim—Global Climate Data.
- Precipitation: Average precipitation within a country in millimeters for 1950-2000. Taken from WorldClim—Global Climate Data.

- Precipitation variability: Variation of yearly precipitation within the country for 1950–2000. Taken from WorldClim—Global Climate Data.

Survey Data from European Social Survey

- People are trusted: Responses on a scale from 1 to 10 provided to the question "Would you say that most people can be trusted, or that you can't bee too careful in dealing with people?", with 1 corresponding to a strong agreement with 'you can't be too careful' and 10 being a strong agreement with 'most people can be trusted'

- People are trusted: Responses on a scale from 1 to 10 provided to the question "Please tell me on a scale from 1 to 10 how much do you personally trust the UN", with 1 corresponding to a firm mistrust and 10 being a strong trust.

- People are helpful: Responses on a scale from 1 to 10 provided to the question "Would you say that most people can be trusted, or that you can't bee too careful in dealing with people?", with 1 corresponding to a strong agreement with 'you can't be too careful' and 10 being a strong agreement with 'most people can be trusted'

- Standard Deviation in Reported Concern over the environment by country of origin: The standard deviation, of the responses from people whose parents come from the same country of origin, to following statement: "Now I will briefly describe some people. Please listen to each description and tell me how much each person is or is not like you. Use this card for your answer. She/he strongly believes that people should care for nature. Looking after the environment is important to her/him." Respondents get to pick a number ranging from 1 (Very much like me) to 6 (Not like me at all) Standard Deviation in left-right political inclination by country of origin: The standard deviation, of the responses from people whose parents come from the same country of origin, to following question: "In politics people sometimes talk of left and right. Using this card, where would you place yourself on this scale, where 0 means the left and 10 means the right?"